



Roll Your Own Da Vinci Style

Worm Gear

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SUMMARY

Da Vinci used wooden gears in many of his mechanisms and drawings. I've already figured out how to use "cage" or "lantern" gears (Make Magazine, October 2010). For my next project I decided to explore making a wooden worm gear. I'll show you how I built it.

I used a 1"-diameter poplar dowel (a standard item at Home Depot and Furrow). I used SketchUp to draw the gear using an involute-gear program. I used 1/4" birch plywood to cut the mating spur gear. It has 60 teeth and is 10" in diameter. You need two measurements to lay out the worm: 1) the "pitch" is the tooth-to-tooth distance of the spur gear, about 1/2". 2) The other measurement is the outside circumference of the cylinder from which the worm gear will be cut (3.14").

To lay out the worm, draw a right triangle on a 17" by 11" piece of paper. For each circumference, go up one pitch. You should end up with a long narrow triangle. Cut this out carefully and wrap it around a 6" length of the dowel. (Depending on how you wrap the screw, it will be left- or right-handed.) Using tacky glue, hot glue or tape, fasten the paper to the dowel. I used a pencil to mark the edge of the paper.

Next, I used a small fine-tooth Japanese-style pull saw to cut a 1/4" groove all along the line.

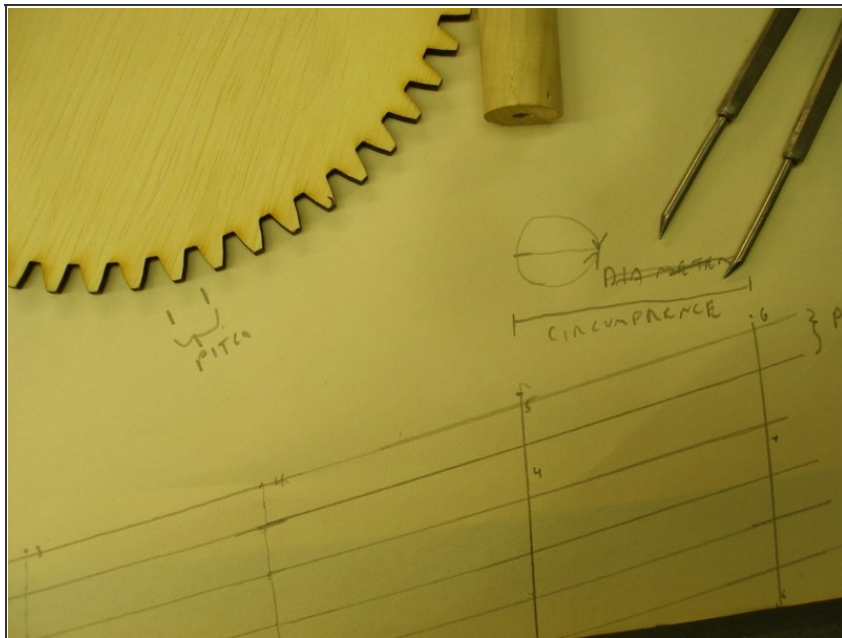
After getting the first cut done, I carefully expanded the cut by cutting down from each side in a "V" pattern. I finished up with a triangular file and sandpaper. In the old days, large

screws for wine- and cider presses were carved entirely using hammer and chisel. Once the screw was cut, a tap was made from it, and that was used to make the nuts. I plan to write another article about making wooden screws and nuts later.

I used dowels and glue to attach all the parts. The supports are recycled oak from a kitchen remodel project and a couple of other scraps.

The Da Vinci worm gear works well. The worm gear offers a large mechanical advantage. Each full turn of the crank moves the gear wheel one tooth; a 60-to-1 advantage. I hope to utilize both worm and lantern gears in my next Da Vinci project.

Step 1 — Roll Your Own Da Vinci Style Worm Gear



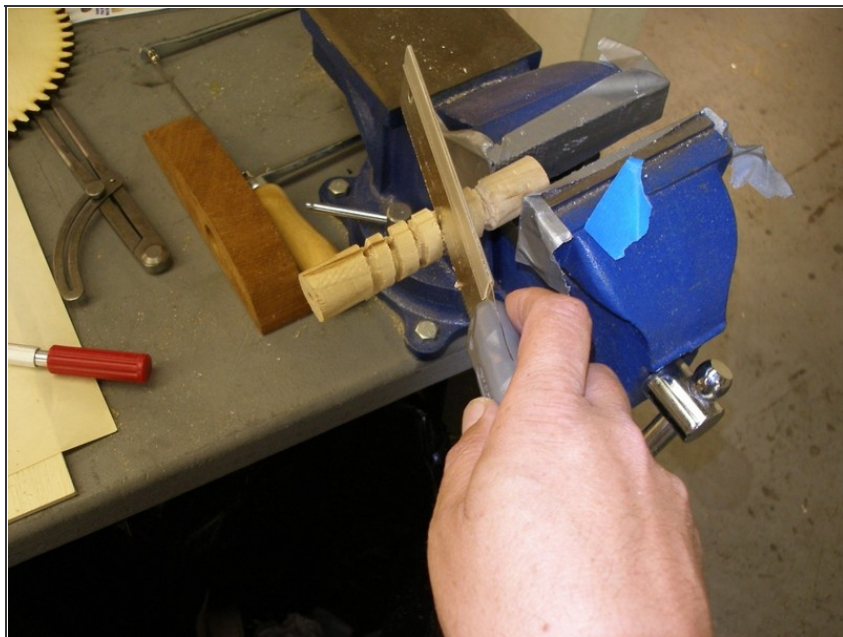
- Layout is important.

Step 2



- Guide wrapped around dowel.

Step 3



- Cutting out worm.

Step 4



- Final assembled project.

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